



Software Development Methodology Reference



Office of Information Technology, Agency Software Division
System Development Methodology Reference

1.	Waterfall	3
2.	Joint Application Development (JAD)	3
3.	Rapid Application Development (RAD).....	3
4.	Spiral Model	4
5.	Iterative System Development Methodology	4

1. Waterfall

- Often considered the classic approach to the systems development life cycle, the waterfall model describes a development method that is linear and sequential.
- Waterfall development has distinct goals for each phase of development. Once a phase of development is completed, the development proceeds to the next phase and there is no turning back.
- The advantage of waterfall development is that it allows for departmentalization and managerial control. A schedule can be set with deadlines for each stage of development and a product can proceed through the development process like a car in a carwash, and theoretically, be delivered on time.
- Development moves from concept, through design, implementation, testing, installation, troubleshooting, and ends up at operation and maintenance. Each phase of development proceeds in strict order, without any overlapping or iterative steps.
- The disadvantage of waterfall development is that it does not allow for much reflection or revision. Once an application is in the testing stage, it is very difficult to go back and change something that was not well-thought out in the concept stage.

1. Joint Application Development (JAD)

- A methodology that involves the client or end user in the design and development of an application, through a succession of collaborative workshops called JAD sessions.
- The JAD approach, in comparison with the more traditional practice, is thought to lead to faster development times and greater client satisfaction, because the client is involved throughout the development process.
- In comparison, in the traditional approach to systems development, the developer investigates the system requirements and develops an application, with client input consisting of a series of interviews.

2. Rapid Application Development (RAD)

- A concept that products can be developed faster and of higher quality through:
 - Gathering requirements using workshops or focus groups
 - Prototyping and early, reiterative user testing of designs
 - The re-use of software components
 - A rigidly paced schedule that defers design improvements to the next product version
 - Less formality in reviews and other team communication
- Some companies offer products that provide some or all of the tools for RAD software development. (The concept can be applied to hardware development as well.) These products include requirements gathering tools, prototyping tools, computer-aided software engineering tools, language development environments such as those for the Java platform, groupware for communication among development members, and testing tools.
- RAD usually embraces object-oriented programming methodology, which inherently fosters software re-use. The most popular object-oriented programming languages, C++ and Java, are offered in visual programming packages often described as providing rapid application development.

3. Spiral Model

- This model of development combines the features of the prototyping model and the waterfall model. The spiral model is favored for large, expensive, and complicated projects. The steps in the spiral model can be generalized as follows:
 1. The new system requirements are defined in as much detail as possible. This usually involves interviewing a number of users representing all the external or internal users and other aspects of the existing system.
 2. A preliminary design is created for the new system.
 3. A first prototype of the new system is constructed from the preliminary design. This is usually a scaled-down system, and represents an approximation of the characteristics of the final product.
 4. A second prototype is evolved by a fourfold procedure: (1) evaluating the first prototype in terms of its strengths, weaknesses, and risks; (2) defining the requirements of the second prototype; (3) planning and designing the second prototype; (4) constructing and testing the second prototype.
 5. At the customer's option, the entire project can be aborted if the risk is deemed too great. Risk factors might involve development cost overruns, operating-cost miscalculation, or any other factor that could, in the customer's judgment, result in a less-than-satisfactory final product.
 6. The existing prototype is evaluated in the same manner as was the previous prototype, and, if necessary, another prototype is developed from it according to the fourfold procedure outlined above.
 7. The preceding steps are iterated until the customer is satisfied that the refined prototype represents the final product desired.
 8. The final system is constructed, based on the refined prototype.
 9. The final system is thoroughly evaluated and tested. Routine maintenance is carried out on a continuing basis to prevent large-scale failures and to minimize downtime.

4. Iterative System Development Methodology

- In software development, iterative is used to describe a heuristic planning and development process where an application is developed in small sections called iterations.
- Each iteration is reviewed and critiqued by the software team and potential end-users; insights gained from the critique of an iteration are used to determine the next step in development.
- Data models or sequence diagrams, which are often used to map out iterations, keep track of what has been tried, approved, or discarded, and eventually serve as a kind of blueprint for the final product.
- The challenge in iterative development is to make sure all the iterations are compatible.
- The advantage of using iterative development is that the end-user is involved in the development process. Instead of waiting until the application is a final product, when it may not be possible to make changes easily, problems are identified and solved at each stage of development.
- Iterative development is sometimes called circular or evolutionary development.